



Z A S

Expressing Similarity

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Similarity Demonstratives

Similarity in Cognitive Science

Goodman 1972

"Similarity, ever ready to solve philosophical problems and overcome obstacles, is a pretender, an impostor, a quack." (p. 437)

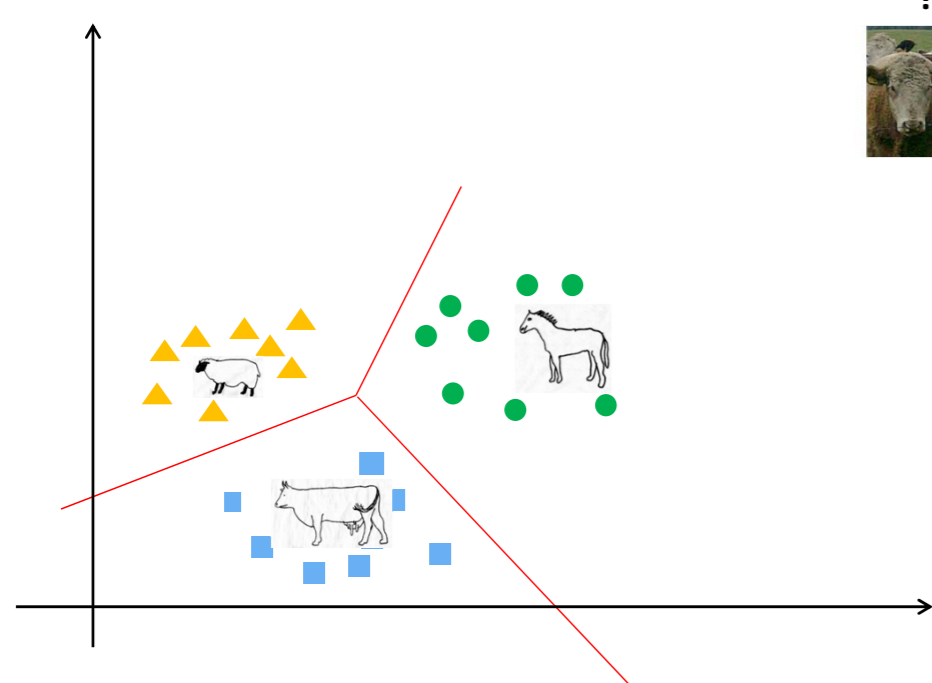
Quine 1969

"... surely there is nothing more basic to thought and language than our sense of similarity; our sorting of things into kinds." (116)

Tversky 1977

"Similarity [...] serves as an organizing principle by which individuals classify objects, form concepts, and make generalizations." (p. 327)

similarity-based classification



Characteristics of similarity

Asymmetry

- (a) North Korea is similar to Red China.
- (b) Red China is similar to North Korea.

Similarity in (a) is rated higher than in (b)
(Tversky 77, but see also Gleitman et al. 96)

Informativeness

Quaggas are similar to zebras.
⇒ Quaggas have four legs
(Medin & Goldstone 95)

Anomaly

?? Robins are similar to birds
?? Robins are similar to questions.
(Medin & Goldstone 95)

Note that anomaly corresponds to the **constraints on coordination** – semantic difference and the existence of a superordinate concept – proposed in Lang (1984)

The German demonstrative 'so'



ad-adjectival

So groß ist Anna.
'Anna is this tall.'



ad-nominal

So ein Auto hat Anna.
'Anna has a car like this.'



ad-verbal

So hat Anna das Fahrrad repariert.
'Anna fixed the bike like this.'

The puzzle

- (i) what does the demonstrative **so** refer to?
- (ii) how is it possible that a demonstrative acts as a **modifier**?

Nunberg 1993

The semantics of demonstratives involves

- (a) a deictic component picking out a referent,
- (b) an interpretation contributing to the proposition
- (c) a relation between referent and interpretation which **need not be identity**.

The solution

- (i) The **referent** of the demonstrative **so** is the individual **pointed to**.
- (ii) The **relation** between the referent and the interpretation is **similarity**.

[[*So ein Auto hat Anna.*]] =

∃x. car(x) & sim(x, ref, F) & owns (Anna, x)

where

sim:: similarity relation

ref: the car the speaker points to

x: the discourse referent of the NP

F: a set of features of comparison (color, ...)

Multi-dimensional attribute spaces

How to spell out similarity?

Measure function

(Kennedy 1999)

f: U → degrees

e.g. height (Anna) = 180cm

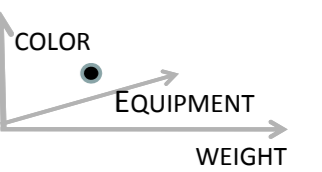


Generalized measure function

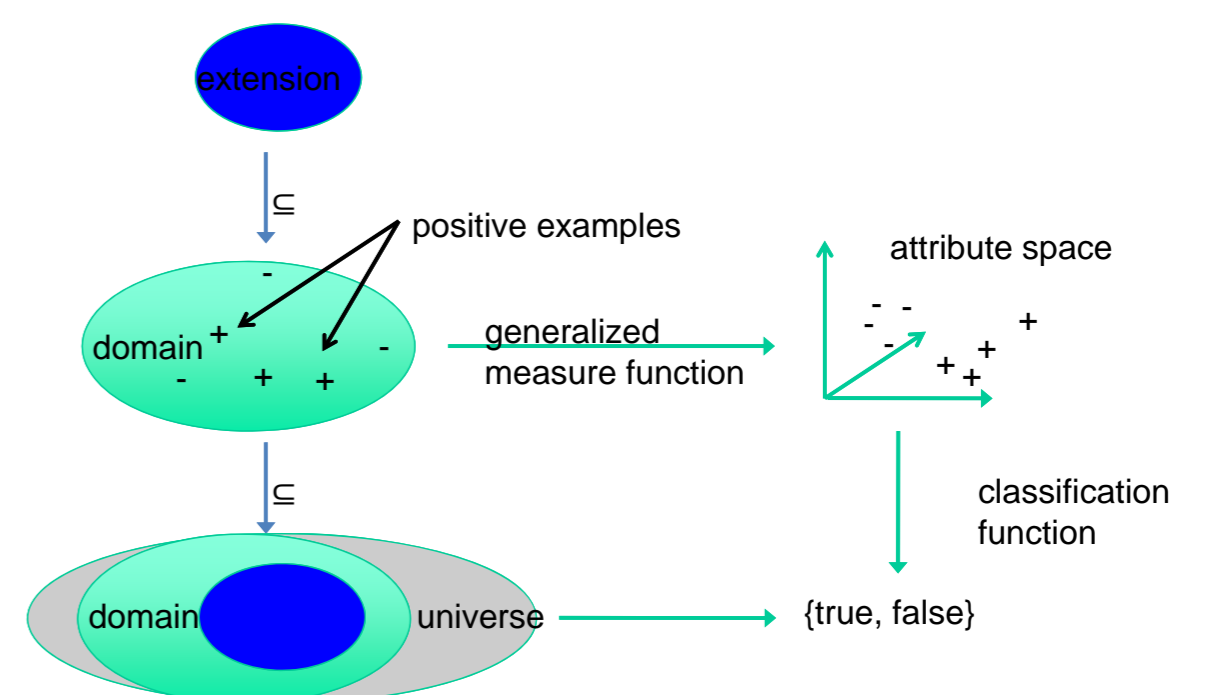
(Gust, Umbach 2010)

F : U → points in multi-dimensional spaces

e.g. F(Anna's car) = <color: blue,
equipment: radio,
weight: 900kg>



Referential semantics + attribute spaces



Ways of implementing similarity

- **Feature contrast** (Tversky 77)
compare common/distinct weighted features
- **Conceptual spaces** (Gärdenfors 2000)
quantitative similarity measure based on geometrical distance
- **Attribute spaces** (Gust, Umbach 2010)
qualitative similarity measure based on indiscernability w.r.t. properties defined on dimensions

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